

REMARKS/ARGUMENTS

Favorable reconsideration of this application is requested in view of the above amendments and in light of the following remarks and discussion.

Claims 1-11 and 20-28 are pending. Claim 12 was canceled previously. Claims 13-19 are canceled by the present amendment. Claims 1 and 6 and the specification are amended. Claims 20-28 are newly added. Support for the amendment to the specification is self-evident. Support for the amendments to Claims 1 and 6 is also self-evident and can further be found on page 2, line 15, and page 23, lines 20-22 of the original specification, for example. Support for newly added dependent Claim 20 can be found on page 29, lines 5-6 of the original specification, for example. Support for newly added Claims 22, 23, 25, 26, and 27 can be found on page 2, line 15; page 23, lines 20-22; page 24, lines 9-10; and page 25, lines 6-8, for example. Support for newly added Claims 25 and 28 can be found on page 4, lines 5-9 of the original specification and in Fig. 8B, for example. No new matter is added.

In the outstanding Office Action, the specification was objected to for informalities. Claims 1-11 and 13-19 were rejected under 35 U.S.C. § 112, second paragraph, as indefinite. Claims 13-19 were rejected under 35 U.S.C. § 102(b) as anticipated by Van Autryve et al. (U.S. Patent No. 6,014,979, herein "Van Autryve"). Claims 1-5 were rejected under 35 U.S.C. § 103(a) as obvious over Van Autryve in view of Yamada et al. (U.S. Patent No. 6,159,862, herein "Yamada"). Claims 6-11 were rejected under 35 U.S.C. § 103(a) as obvious over Van Autryve, Yamada, and Qian et al. (U.S. Patent No. 6,136,211, herein "Qian"). Claims 1-5 were rejected under 35 U.S.C. § 103(a) as obvious over Chen et al. (U.S. Patent No. 6,394,104, herein "Chen") in view of Yamada.

At the outset, Applicant notes with appreciation the courtesy of a personal interview granted to Applicant's representative by Primary Examiner Sharidan Carrillo. In combination with the Interview Summary provided by Primary Examiner Carrillo, the

substance of the personal interview is substantially summarized below in accordance with MPEP § 713.04.

Regarding the objection to the specification for describing "chlorine/fluorine" rather than "fluorine/carbon," the specification is amended to describe "fluorine/carbon" as suggested on page 2 of the outstanding Office Action. Accordingly, Applicant respectfully submits that the objection to the specification is overcome.

Regarding the rejection of Claims 1-11 and 13-19 as indefinite for reciting "fluorine/chlorine," independent Claims 1 and 6 are amended in accordance with the language suggested in the outstanding Office Action regarding this issue. Accordingly, Applicant respectfully submits that the rejection with regard to Claims 1 and 6 is overcome. Claims 13-19 are canceled, and any rejection with respect to these claims is negated.

As Claims 13-19 are canceled, Applicant respectfully submits that the rejection of these claims as anticipated by Van Autryve and the rejection of these claims as anticipated by Qian no longer applies.

Regarding the rejection of Claims 1-5 as obvious over Van Autryve in view of the Background section of the present application and further in view of Yamada, that rejection is respectfully traversed by the present response.

As discussed during the personal interview, Claim 1 recites a first plasma processing process conducted with a first process gas. The first plasma processing process is followed by a dry cleaning process. The dry cleaning process is immediately followed by a second plasma processing process. The first plasma process uses a different gas than the second plasma process. The first process causes deposits to accumulate in the chamber. The second plasma process includes a plasma etching performed without producing deposits in the chamber.

As discussed during the personal interview, Van Autryve performs the same process both before and after its cleaning process. As further discussed during the personal interview, Van Autryve does not use a different gas composition in the first process than is used in the second process. Rather, no matter what combination of gases is used in the first process described in Van Autryve, the same combination of gases is used in the second process described in Van Autryve.

As further discussed during the personal interview, the Background section of the specification indicates that, in conventional cleaning methods, **a seasoning step is required** between a cleaning process and a second plasma process. In other words, the Background section of the specification describes conventional processes in which the second plasma process does not follow right after the cleaning process, but rather, a seasoning process is required between the cleaning and second plasma process. Thus, a person of ordinary skill in the art reading the Background section and not using the description of the present invention as a roadmap would understand that a seasoning process is required between a cleaning step and a subsequent plasma processing step. Accordingly, no reasonable combination of Van Autryve and the Background section of the present application would include all of the features recited in amended independent Claim 1.

In addition to the Background section, the outstanding Office Action relies on Yamada for the relative F/C ratios recited in independent Claim 1. Yamada describes that a gas with a low F/C ratio can provide polymer deposition. However, Van Autryve describes performing identical processes before and after the cleaning process, and the mere discussion of the effects of different F/C ratios provided by Yamada would not have lead a person of ordinary skill in the art to change the process performed in Van Autryve occurring after the cleaning process to be different from the process conducted before the cleaning process. Rather, the intended use of Van Autryve is to perform an identical process over and over

again without changing the process. Accordingly, Applicant respectfully submits that no proper combination of Van Autryve, the Background section, and Yamada would include all of the features recited in amended independent Claim 1 or the claims depending therefrom.

Regarding the rejection of Claims 1-5 as obvious over Chen in view of Applicant's Background section and Yamada, Applicant respectfully submits that Chen suffers from the same deficiencies as discussed above regarding Van Autryve inasmuch as Chen describes processing a series of wafers and then providing a cleaning process. Chen does not describe using a different process gas in a process conducted after a cleaning process than is used in the process conducted before the cleaning process. In fact, Chen is silent regarding gases used in any process conducted after the cleaning process. Accordingly, Applicant respectfully submits that amended independent Claim 1 and Claims 2-5 depending therefrom patentably distinguish over any proper combination of Chen, Applicant's background art, and Yamada for at least the reasons discussed above.

Regarding the rejection of Claims 6-11 as obvious over Van Autryve, Applicant's Background section, Yamada and Qian, that rejection is respectfully traversed by the present response.

Claim 6 recites substantially similar features to those discussed above regarding amended independent Claim 1 and patentably distinguishes over Van Autryve, Applicant's background art, and Yamada for at least the same reasons as Claim 1 does.

The outstanding Office Action relies on Qian for the particular ratio of cleaning gas to etchant gas recited in independent Claim 6. However, Applicant respectfully submits that Qian fails to remedy the deficiencies discussed above regarding Van Autryve. Rather, Qian is directed to etching a substrate without performing a separate cleaning step for cleaning a chamber in between processing the substrates. Qian does not suggest that a first plasma processing step conducted before a cleaning step is conducted with a different gas from a

second plasma processing step conducted immediately after the cleaning step. Accordingly, Applicant respectfully submits that no proper combination of Van Autryve, Yamada, Applicant's background art, and Qian would include all of the features recited in amended independent Claim 6 or the claims depending therefrom.

Newly added dependent Claim 20 recites that the ratio of the flow rate of the dummy substrate etching gas to that of the deposit removing gas is not less than about 0.29%, but not larger than about 1.4%. Applicant respectfully submits that the ratio described in Qian and cited in the outstanding Office Action, 5%, is outside the range recited in newly added dependent Claim 20, and newly added dependent Claim 20 further patentably distinguishes over any proper combination of the cited references for at least this additional reason.

Newly added dependent Claim 21 specifies that the first CF-based gas, which is used in the first processing step, includes C₄F₈, the deposit removing gas includes O₂, and the dummy substrate etching gas includes CF₄. The second CF-based gas includes CF₄, O₂ and argon and is used in the second plasma processing step. As discussed during the personal interview, the different gases used in the first and second plasma processing steps are thus more specifically recited in newly added dependent Claim 21. Van Autryve and Chen do not provide a different plasma process after the cleaning step from the plasma process before the cleaning step. Accordingly, Applicant respectfully submits that newly added dependent Claim 21 and newly added dependent Claim 25, which recites substantially similar features further patentably distinguish over any proper combination of the cited references.

Newly added dependent Claim 22 recites that the first CF-based gas, supplied in the first plasma processing step, **consists** of C₄F₈. The deposit removing gas supplied in the dry cleaning step **consists** of O₂. The dummy substrate etching gas consists of CF₄. The second CF-based gas, supplied in the second plasma processing step, **consists** of CF₄, O₂ and Ar. Newly added dependent Claim 26 recites substantially similar features. As discussed during

the personal interview, no proper combination of the cited references would provide the particular combination of gaseous compositions recited in newly added dependent Claims 22 and 26.

Newly added dependent Claims 24 and 28 recite that the second plasma processing step and dry cleaning step are carried out without a seasoning step occurring between the dry cleaning step and second processing step. These claims further recite that the second plasma processing step is stabilized by the cleaning step such that an etch rate at the beginning of the second plasma processing step is approximately equal to an etch rate five minutes after beginning the second plasma processing step. One example of the above-noted arrangement is shown in Fig. 8D where the etching rate at the beginning of the process is approximately equal to the etching rate five minutes after the beginning of the second plasma process.

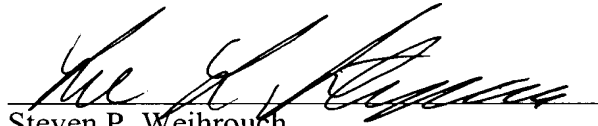
As discussed during the personal interview, Van Autryve requires a "seasoning" in order to condition the chamber for the second process. Chen does not describe a second process at all. Accordingly, Applicant respectfully submits that no proper combination of the cited references would include all of the features recited in newly added dependent Claims 24 and 28.

For the foregoing reasons, it is respectfully submitted that this application is now in condition for allowance. A Notice of Allowance for Claims 1-11 and 20-28 is earnestly solicited.

Should Primary Examiner Carrillo deem that any further action is necessary to place this application in even better form for allowance, she is encouraged to contact Applicant's undersigned representative at the below-listed telephone number.

Respectfully submitted,

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